

The Amateur Radio

COMMUNICATOR

MARCH/APRIL 1992

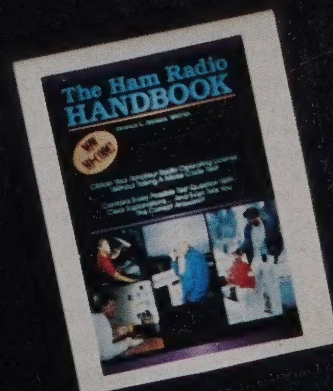
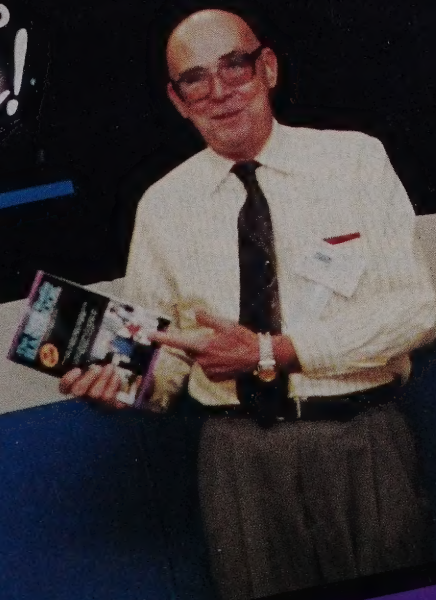
Volume 2 Number 2

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- *Signals and Emissions*
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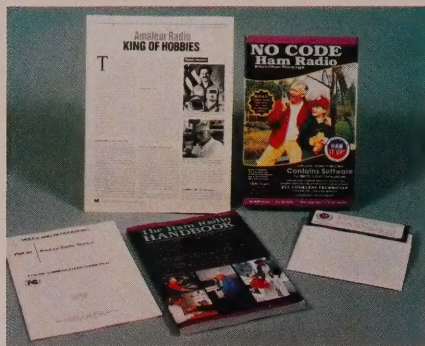
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NATIONAL AMATEUR RADIO ASSOCIATION

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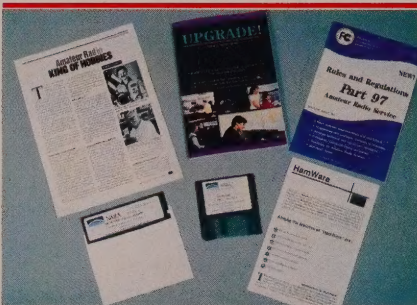
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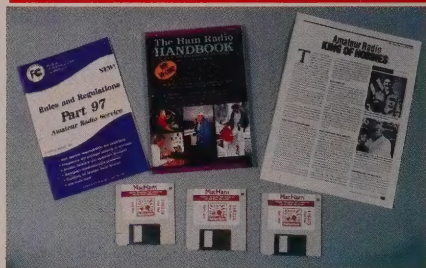
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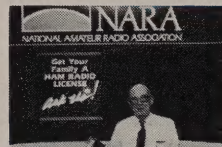
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ON THE COVER



Who is this guy? Doesn't he look familiar?! Well, if you haven't recognized him by now, this is a picture of NARA's very own President and Editor, Don Stoner, working NARA's booth at the Dayton HamVention show in 1991. There are many a good things to be found at one of the world's largest ham shows. Come on down and say "hi" to us in person. NARA will be there for the entire HamVention again
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The Amateur Radio Communicator

The Amateur Radio Communicator is published monthly and is the official journal of the National Amateur Radio Association (NARA), P.O. Box 598, Redmond, WA 98073-0598.

The National Amateur Radio Association is incorporated in the State of Washington and is an exempt organization as defined in Section 501(c)(3) of the Internal Revenue Service Code.

Organization Goals

The National Amateur Radio Association is a nonprofit organization. It consists of individuals interested in the art of radio communication. The broad goal of NARA is to make Amateur Radio more widely known and to encourage more people to become involved in the Amateur Radio Service.

The organization has four specific goals within this broad framework. These are to a) publicize Amateur Radio to the general public, b) attract young people to the Amateur Radio Service, c) help existing Amateurs achieve the greatest benefit from the Amateur Radio Service and d) make Amateurs aware that our radio frequencies are in jeopardy from commercial interests.

NARA advertises in various consumer publications to create a public awareness of the Amateur Radio Service and to encourage readers to write NARA for more information. The Association also solicits authors who write on the subject of Amateur Radio in these publications. NARA has committed itself to making Amateur Radio more interesting and more accessible to all concerned.

NARA is specifically interested in encouraging young people to join our fraternity. The organization works with educators to increase awareness of the Amateur Radio Service and its value as an interesting way of educating young people. A core of young people insures continued growth of the Amateur Radio Service.

NARA believes that existing Amateurs should be more aware of the radio communication theory. Each month an article will appear in *The Amateur Radio Communicator* which discusses a technical aspect of the Amateur Radio Service.

NARA is very concerned that confiscation of frequencies assigned to the Amateur Radio Service will continue. These frequencies are a precious resource. On the other hand, there are an inadequate number of frequencies to accommodate all the new communication requirements. Amateurs must create an environment where it is more beneficial to the public to have Amateur Radio operators on these frequencies than new and emerging commercial services.

Membership and Subscriptions

Those joining NARA receive a subscription to *The Amateur Radio Communicator* for a period of one year. The combined cost of membership and magazine is \$10.00 per year in all areas with a U.S. ZIP code.

The NARA membership and subscription to *The Amateur Radio Communicator* cannot be separated. Since NARA is a nonprofit organization, the membership cost may be tax deductible. Verify this with your accountant.

It is not necessary to hold an Amateur

Radio license to become a member of the National Amateur Radio Association. The only "qualification" is an interest in radio communications.

Editorial Policy

Each article and column which appears in *The Amateur Radio Communicator* is evaluated by the Editorial Board to meet a single criteria: how it contributes to NARA's educational objectives. Editorial material is intended to either (1) interest new people in becoming a Radio Amateur, (2) help existing Radio Amateurs get more out of their hobby through better understanding, (3) explain the theory behind some aspect of the service or (4) educate Amateurs on how to retain our valuable spectrum.

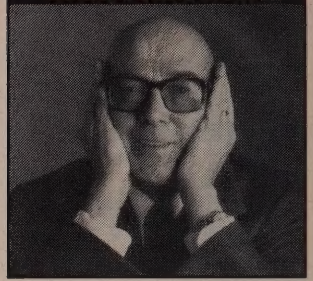
How To Contact NARA

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Hams Are Mad As Hell

by Don Stoner, W6TNS

It has been my policy to never say anything bad in *The Amateur Radio Communicator* about ham radio or Amateurs, either singly or as a group. Newcomers will discover soon enough that a few "bad apples" inhabit our radiowave barrel without my directing their attention to it.

I am about to break that rule with something that needs to be said. The most common subject, in letters and EMAIL crossing my desk, relates to the subject of obscenity on ham radio. Over the past few months, I have received mail that says, in effect, "If this is they way hams are, then I'm not interested in joining your service." Increasingly I see the efforts of NARA to recruit new hams diluted by these polluters of our airwaves. Other letters implore NARA to use their "influence" with the FCC to have them "fix" this unpleasant situation. The former has caused me to speak out on obscenity in this editorial. I'm afraid I cannot do much for the latter. The FCC cannot solve this problem for us, with or without my "influence."

The matter came to a head in my mind (no pun intended) during the FCC Forum at the Miami HamVention in February. Mr. Ralph Haller gave an excellent summary of the no-code license ("It's an unqualified success") and a minor rebuke of those who send frivolous requests for rule changes to the FCC. He then opened the forum to questions from the audience.

A prominent Amateur in attendance immediately nailed Mr. Haller with the accumulated frustration of all Amateurs regarding the obscenity one hears on the air. The response was a rather "broad-brush" answer, but it was not sufficient for my fellow inquisitor. He bored in, painting the FCC into an uncomfortable corner. Mr. Haller was forced to admit that there was nothing the FCC could do about this unfortunate situation.

Under the First
Amendment not
much can be done
about the use of
offensive language
on the air.

This is a classic case of community versus individual rights. Somewhere about the time of Camelot, the liberal community—abated and abetted by the media and the ACLU—came to the conclusion that the rights of the individual were more important than the rights of the majority. As a result, we are now in the process of "democracing" our nation into oblivion. If the FCC were to cite anyone for obscenity, the person or persons—along with a battery of

lawyers—would scream "civil rights" so loudly it could be heard at great length without benefit of rig or antenna. The FCC has neither the funds nor the time to engage in what is obviously a losing battle—nor should they be expected to do so.

I had a theory that the Amateur fraternity was a community of people, all bound together by electric waves. Since we are a community, and those purveyors of filth exceeded our contemporary community standards, the fraternity could bring civil action against them. Boy, was I in for a shock! I asked a lawyer friend and what he told me was truly discouraging.

Under the First Amendment not much can be done about the use of offensive language on the air. For something to be legally obscene, it must meet all parts of a three-part test; a violation of contemporary community standards is only one of the things that must be shown. And community standards are determined by the standards of the larger community, not by those of Amateur Radio operators. California defines obscenity as something that violates *state-wide community standards*, in addition to meeting the other parts of the test. Compared to the movies being shown in California and the magazines routinely sold on newsracks—what you hear on the "Southern California filth repeater" *doesn't even come close to the legal definition of obscenity*. Most of it isn't even indecent. (There's a different legal standard for indecency on the

airwaves, at least *at times when large numbers of children might be listening*, and even that standard is now in doubt under a decision last year by the D.C. Circuit Court of Appeals).

Could an Amateur—or a group of Amateurs—file civil lawsuits against some of the foulest-mouthed hams anyway? I guess we could find a legal theory to hang it on, so such a lawsuit could be filed. But the case would surely be dismissed rather quickly on summary judgment, and the party filing it would risk sanctions for abusing the system by filing a frivolous harassment lawsuit. I'm not saying there's not a lawyer who would be willing to file such a lawsuit, but I doubt if many reputable ones would do it. And I can't imagine it going far enough to discourage other hams from using offensive language on the air.

I don't think this ends the subject—far from it! For the moment, I don't have any more "answers." But I do know that something must be done about this disaster and I am open to any suggestions. To the newcomers to our fraternity, believe me when I say that these people represent an infinitesimally small fraction of our fraternity. Those who find pleasure in polluting our airwaves with

their filth simply engage in an exercise to call attention to themselves. They never learned the meaning of "class." Often they are insignificant people who have never accomplished anything in their drab little lives. Suddenly, they discover the power of a microphone (or the power to hide behind the microphone) and its ability to draw attention to themselves. At last, with an Amateur license, and their foul mouths, they become somebody to which people will pay attention. And they love the attention. Look at me! Listen to me—I *am* somebody!

Maybe if we ignore them, they will go away. On the other hand, they may get more bold and infest other bands with long-range consequences. I hope not.

THE MEANING OF LIFE

You've all seen the comic strip where the cartoon character claws his way to the top of a mountain to ask the resident guru, "What is the meaning of life?" I recently found the answer without making the trip to the mountain. It was revealed to me during a visit to the Morton Plant Hospital.

My odyssey started the morning of February 28th. I awoke with a terrific gut ache. Just indigestion, I

assumed as I downed a helping of Kellogg's crispy something or others. But relief didn't arrive. Rather, the pain got worse. Finally, about noon, the thought penetrated my thick skull that this was not normal—I had never felt anything quite like this before. Shortly thereafter, my bride delivered me to the emergency entrance of the pill factory.

After what seemed an eternity, the forms were all filled out, each "I" dotted and each "T" crossed. They were convinced that I had insurance and could extricate myself from any financial situation that might be heaped upon me.

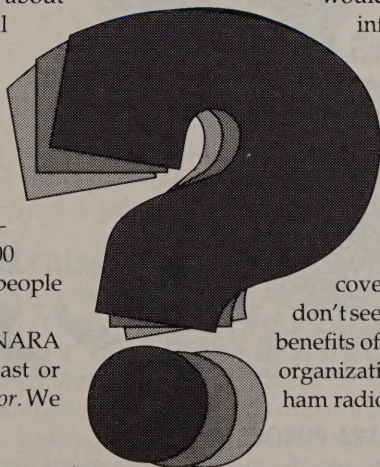
I can't say enough good things about the people in the emergency room. A young intern poked and shoved at me, seemingly trying to rearrange my intestines. He didn't like what he felt and had the foresight to not assume it was something I ate. He sent me off to x-ray. The fuzzy black and white image showed something was wrong—I had more in my belly than the Lord originally issued to me! Once again, I was off on a high speed ride—this time for the Sonogram laboratory. Yep, there it was—the mother of all arterial aneurysms throbbing with each

(Continued on page 4)

HOW DID I GET THIS MAGAZINE?

ONE OF THE WAYS WE CAN TELL THE WORLD about the goals and ambitions of the National Amateur Radio Association is to supply complimentary copies to non-Amateurs. We send copies of each issue to hobby shops and science centers, and about 6,000 pieces to newly licensed hams. This magazine is also mailed to a select list of people who might be interested in becoming Amateurs. We also send approximately 10,000 copies to NARA members and prominent people in Amateur Radio.

If your mailing label does not include a NARA membership number, this may be your last or only copy of *The Amateur Radio Communicator*. We



would like to continue providing you with this informative publication, but we can only do so if you are a member. For those interested in becoming a ham, or who are newly licensed, a membership in NARA represents an outstanding bargain. A membership, which includes a subscription to *The Amateur Radio Communicator*, is only \$10.00 per year.

Check the mailing label on the back cover for your membership number. If you don't see one, look up about six inches and read the benefits of becoming a member of this fast-growing organization. We need your support and so does ham radio. Help us get it "going and growing!"

beat of my heart. I watched the CRT image expand and contract with the image of death. I took one more ride, this time to the CAT-scan department to dimension the rascal.

What is an aneurysm? Did you ever see the inner tube pooch through the weak wall of an automobile or truck tire? Well, as one gets older the walls of the arteries get weaker just like the rubber tire. If one has high blood pressure (I do), it can cause the artery to expand over time and the walls to become thin and lose their strength. And just like the truck tire an arterial aneurysm will eventually weaken, and blow. When it does finally go, one has approximately sufficient time to say either a "Hail Mary" or an "Our Father," but not both.

By this time, the internal special-

ists had started hovering over me, back in the emergency ward. "What are my options, Doc," I asked? The reply was given in terms I could handle, but essentially it amounted to "you're going to the operating room or the funeral parlour, your choice." Some choice!

Once I signed the release, things happened so fast that I didn't have time to get frightened. Maybe it's just as well. The next thing I knew, I woke up in the recovery room. It takes one a period of time in the recovery room to adjust to fact that they are back in reality and still alive. Once this realization sets in however, you become very thankful, and it is then that you begin to discover the "meaning of life." It's a simple realization, not very profound, but I'd like to share it with you. *Any*

morning that you wake up is a good day. There is nothing in the world, as important to you, as waking up each morning. And you should live each day as if you might not wake up tomorrow morning. Maybe if everyone subscribed to this concept, the world would be a better place in which to live. I know mine is.

LATE AGAIN

I'm sure you've noticed that the last issue of the *Amateur Radio Communicator* and this one, have been late, but you must admit that I have rather an unusual excuse! This experience has put me out of business for several weeks. We should have things back to normal around here by the next issue. My staff and I greatly appreciate your patience.

73, DE Don, W6TNS

Letters

HIRAM PERCY MAXIM REVISITED

I was given a copy of your magazine, the November 1991 issue and was reading the article, "NARA Versus The ARRL."

This article was very informative in many ways, first it described your editorial stand, and secondly it demonstrated that hams are not single minded in their hobby.

On page three of your article you printed a picture of Hiram Percy Maxim. The caption said he was a co-founder of the ARRL, also I would guess he was a ham.

Interestingly, he is also the "father" of the silenced firearm. That's right, he was the inventor of many types of gun silencers. In the early 1900s, he offered a catalog of various types of silencers. These were used by target shooters as well as hunters. Maxim recognized the fact of noise pollution, way back then, and tried to do something about it. So, as you see hams do have many interests.

Sincerely,

James MacKenzie, N2OQD

P.S. I've enclosed a couple of pages from Maxim's catalog. Keep up the good ham work.



NARA PUBLICATIONS

Thanks to Don Stoner's book, *The Ham Radio Handbook*, I passed! The

new no-code Technician examination, this past Saturday, was given by ARRL out at Fort Gordon. Can you believe that I have only had the book about one month? [Yes!—Ed.]

While I am on a "roll," I am preparing for the General Class test. Again, many thanks for a book that was written in terms that I could grasp with ease.

Sincerely,

Rick Ward

Augusta, Georgia

ENJOYING HAM RADIO

Just thought I would give a brief progress report. It is almost exactly two months since I first contacted you regarding a new license. Last month I passed Elements 1A, 1B, 2 and 3A. Today I passed 3B (96 percent) and 4A (92 percent—kids kept me from the books last week). So now I am an Advanced Amateur in two months except I don't have a call sign yet!

My brother-in-law, N6KN, semi-permanently loaned me a tweaked TS-180 transceiver yesterday, so I should be on the air as soon as I can get up an antenna and the call sign

(Continued on page 16)

Signals and Emissions

by Terry R. Dettmann, WX7S

W

henever we transmit radio signals, Amateurs face two very important problems.

First is our legal authority to transmit. While I know of some people who consider access to the air waves to be everyone's god-given right, I'm afraid it just ain't so! There isn't a god-given right to transmit in any way you might want. The FCC has the authority to determine which types of transmissions are appropriate and which are not. As an Amateur Radio operator, you have more freedom than most other radio operators. Even so, you still have to obey the rules.

Second, you don't have any right to interfere with other people's use of the air waves. When you transmit a signal that destroys the television reception of your neighbors, you are interfering with their rights. If you interfere with emergency services, you may be endangering a life. If you are going to be an Amateur Radio operator, you must be conscious of what signals you are allowed to transmit.

Any signal that we generate, legal or not, might interfere with other services. Even when our signals are "clean," it is possible to accidentally interfere with poorly designed televisions, radios, and other consumer electronic devices. Without an understanding of interference, you won't be able to deal with problems that may occur.

In this article, we're going to look briefly at the emission types allowed to Amateur Radio operators by the FCC Rules and Regulations. We'll also look at some common problems which can cause interference.

EMISSION TYPES

The emission types authorized for Amateur operation are:

Type	Definition
CW	International Morse Code
Data	Telemetry, Telecommand, and Computer
Image	Facsimile (FAX) and Television
MCW	Tone-Modulated Morse Code
Phone	Voice or other sound communications
Pulse	Pulse-modulated emissions
RTTY	Narrow-Band Direct-Printing Telegraphy
SS	Spread Spectrum Communications
Test	Emission containing no information

Not all Amateur classes can operate in all modes. As you move from Novice through Extra Class, you receive more privileges.

KEY CLICKS

No, key clicks aren't the sounds you hear when your house key goes into the lock. They're the sound you hear when you're receiving a signal from another Amateur whose transmitter is producing too perfect an on/off signal (see Figure 1, page 6). By too perfect, it means the signal itself is

too square, that is, the on-off transitions are too sudden.

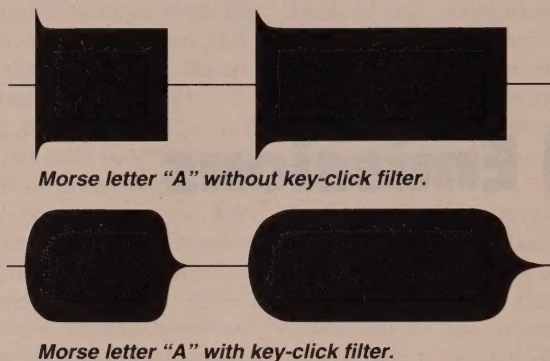
I won't go into any sort of discussion of Signal Processing. If you have the advanced math to understand it, you can study almost any text on Fourier Analysis. You will find out that a perfect-square wave consists of many frequencies mixed together. If you could key a perfect-square wave, it would generate signals across many bands. Your signal would click all over the bands and generate interference from sidebands which are stronger than they should be. To prevent this, a keyclick filter should be installed to round off the keying waveform and produce a cleaner signal.

CHIRPS

Chirps (which sometimes sound like you've got a small bird caught in your transmitter) come from slight frequency variations just as you key the transmitter. Usually this happens because of poor regulation of the transmitter's power supply. Particularly for high-power transmitters, keying a large-power output can drop the voltage in the whole house. If the transmitter's power supply isn't properly regulated (or the voltage drop goes beyond what it can handle), your signal will chirp like a bird.

A common cause of chirp in lower-powered transceivers, even new ones, is the use of an inappropriate power supply. Many modern transceivers are designed for mobile operation and require 12-volt power only. To use them at home, you add a power supply that converts 117-volts ac to

Figure 1



12-volts dc. If you buy a small supply off the shelf from Radio Shack, or try to use one designed for CB operation, it will usually cause chirp. This happens because the power supply just can't handle Amateur transmitter power levels.

The real culprit is variations in the oscillator frequency in the transmitter. The oscillator creates the signal by generating a sine wave within the circuit. If we change the voltage, the oscillation can vary in frequency, causing the signal to vary. This creates the sound we hear as chirp.

SUPERIMPOSED HUM

Was your father a ham? Mine wasn't, but he used to be in electronics. I inherited a lot of old electronic equipment when I first became a ham. I also had plenty of opportunity over the years to raid junk boxes and get old pieces of gear. As I built things from my junk box, the problem of hum raised its ugly head.

You could wind up with a hum in your signal from using an old power supply as the starting point of a project. Old power supplies with large-filter capacitors in them often have this problem. It happens because the electrolytic solution in the filter capacitor has dried out and is no longer properly removing the ripple from the power supply.

THE NOVICE TEST QUESTIONS

The Novice test has these questions on Signals and Emissions. See if you can answer them correctly before you look at the answers.

2H1-1.1

What keying method is used to transmit CW?

- A. Frequency-shift keying of a radio-frequency signal
- B. On/off keying of a radio-frequency signal
- C. Audio-frequency-shift keying of an oscillator tone
- D. On/off keying of an audio-frequency signal

2H1-1.2

What emission type describes International Morse Code telegraphy messages?

- A. RTTY
- B. Image
- C. CW
- D. Phone

2H1-2.1

What emission type describes narrow-band direct printing telegraphy emissions?

- A. RTTY
- B. Image
- C. CW
- D. Phone

2H1-2.2

What keying method is used to transmit RTTY messages?

- A. Frequency-shift keying of a radio-frequency signal
- B. On/off keying of a radio-frequency signal
- C. Digital pulse-code keying of an unmodulated carrier
- D. On/off keying of an audio-frequency signal

2H1-3.1

What emission type describes frequency-modulated voice transmissions?

- A. FM Phone
- B. Image
- C. CW
- D. Single-sideband phone

2H1-4.1

What emission type describes single-sideband suppressed-carrier (SSB) voice transmissions?

- A. FM phone
- B. Image
- C. CW
- D. Sideband phone

2H2.1

What does the term key click mean?

- A. The mechanical noise caused by closing a straight key too hard
- B. The clicking noise from an excessively square CW keyed waveform
- C. The sound produced in a receiver from a CW signal faster than twenty wpm
- D. The sound of a CW signal being copied on an AM receiver

2H2.2

How can key clicks be eliminated?

- A. By reducing your keying speed to less than twenty wpm
- B. By increasing power to the maximum allowable level
- C. By using a power supply with better regulation
- D. By using a key-click filter

2H3.1

What does the term chirp mean?

- A. A distortion in the receiver audio circuits
- B. A high-pitched audio tone transmitted with a CW signal
- C. A slight shift in oscillator frequency each time a CW transmitter is keyed
- D. A slow change in transmitter frequency as the circuit warms up

2H3.2

What can be done to the power supply of a CW transmitter to avoid chirp?

- A. Resonate the power supply filters
- B. Regulate the power supply output voltages
- C. Use a buffer amplifier between the transmitter output and the feed line
- D. Hold the power supply current to a fixed value

2H4.1

What is a common cause of superimposed hum?

- A. Using a nonresonant random-wire antenna
- B. Sympathetic vibrations from a nearby transmitter
- C. Improper neutralization of the transmitter output stage
- D. A defective filter capacitor in the power supply

2H4.2

What type of problem can a bad power-supply filter capacitor cause in a transmitter or receiver?

- A. Sympathetic vibrations in nearby receivers
- B. A superimposed hum or buzzing sound
- C. Extreme changes in antenna resonance
- D. Imbalance in the mixers

NOW CHECK YOUR ANSWERS

OK, let's see what the accepted answers are:

2H1-1.1 What keying method is used

to transmit CW?

B. On/Off keying of the signal transmits intelligence when a code matches the On/Off sequences to meanings. Morse Code is one example of such a code.

2H1-1.2 What emission type describes International Morse Code telegraphy messages?

C. International Morse Code messages sent by telegraphy are an example of CW Emissions. There could be other types of CW emissions which don't use Morse Code, but they aren't in common use.

2H1-2.1 What emission type describes narrow-band direct-printing telegraphy emissions?

A. Radioteletype (RTTY) signals are received and directly printed. If you ever watch old movies, you'll see old teletypewriters printing RTTY signals as they come in.

2H1-2.2 What keying method is used to transmit RTTY messages?

A. Standard RTTY uses a frequency-shifted keying method to represent the on and off signals with different frequencies (see Figure 2).

2H1-3.1 What emission type describes frequency-modulated voice transmissions?

A. (A pretty obvious answer when you break it down.) FM = Frequency Modulation, and Voice transmissions are Phone emissions. Therefore, FM Phone is the obvious answer.

2H1-4.1 What emission type describes single-sideband suppressed-

carrier (SSB) voice transmissions?

D. Single Sideband (Sideband) transmission of voice (Phone) is "Sideband Phone" emission type.

2H2.1 What does the term key click mean?

B. Too much perfection in your keying results in a clicking signal, perfection isn't always the right thing to have (see Figure 1).

2H2.2 How can key clicks be eliminated?

D. A keyclick filter rounds off the waveform to produce a more rounded signal which doesn't click when received (see Figure 1).

2H3.1 What does the term chirp mean?

C. The transmitter-output-frequency changes as the oscillator frequency changes. Since the oscillator depends on the voltage applied to it, if the voltage varies as you transmit, your signal will chirp.

2H3.2 What can be done to the power supply of a CW transmitter to avoid chirp?

B. The power supply voltage will change the output frequency of the transmitter if it's allowed to vary. It controls the frequency of the oscillator which controls the output frequency.

2H4.1 What is a common cause of superimposed hum?

D. In Amateur gear, particularly home-built gear which doesn't use a modern-switching power supply, this is the most common cause of hum in the signal.

2H4.2 What type of problem can a bad power-supply-filter capacitor cause in a transmitter or receiver?

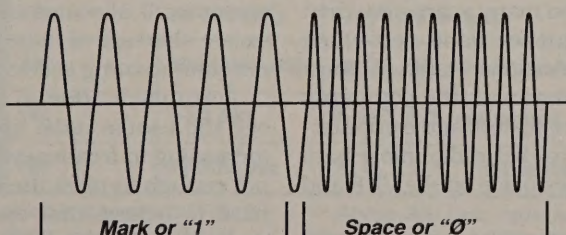
B. This hum will appear as an additional component to your signal whenever you are transmitting. It's annoying and makes it harder to communicate.

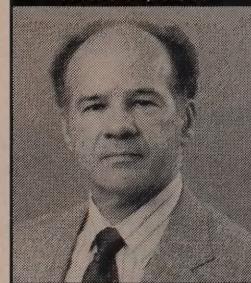
OK, grade yourself. How did you do? Until the next issue,

73 from Terry, WX7S.

Figure 2

Frequency Shift Keying





National Volunteer
Examiner Coordinator

Amateur Radio The Spectrum And DXing

by Frederick O. Maia, W5YI

Want to hear some interesting conversations? Ask a group of non-Amateurs to describe a ham operator and what they do. I make a habit of doing this every so often. It is amazing what the general public thinks they know about ham radio—and also how they feel about it.

I can tell you that for the most part, the average person's impression of a ham operator includes: a big antenna; "talking shortwave" to foreign countries; helping during disasters; knowing Morse code, and messing up TV reception. Those are by far the most the common responses. The public image of a ham operator seems to be that of an electronic loner who confines himself to a little back room.

Few people seem to know that the majority of our operation is actually crystal-clear two-way FM personal communications through repeaters, or computer-to-computer using radio (instead of a telephone) modems. Practically none are aware that hams have two-way satellite or television capability. We Amateurs have done an absolutely lousy PR job! Today there are probably a hundred VHF radio contacts for every one that takes place on the high frequency bands. Still, HF DXing remains a very popular pursuit.

THE RADIO SPECTRUM

After a short discussion, I am invariably asked for my definition of an Amateur. I can answer that in just six words! *Hams communicate with others using radio.* That says it all. The radio spectrum is that invisible long-range expressway system that lies just beyond the audio frequency highway.

What makes "radio" truly extraordinary is that it can be used for different things all at the same time and in the same place! Radios, television, microwave ovens, and more can all operate simultaneously. It is merely a case of accessing the right radio range.

Like sound, radio waves are a series of produced vibrations or alternating antenna current cycles. There are just more of them. Some waves are longer and therefore have a relatively low frequency—or number of cycles occurring in a second. Other frequency bands are known as medium, high, very high, ultra high, superhigh and extremely high.

Amateurs are only authorized to "hitchhike" on the medium and higher frequency wavelength bands. (See Table No. 1.) For each wavelength there is a corresponding frequency.

It wasn't too many years ago when the high frequency band accounted for nearly all Amateur Radio communications. Today, with the popularity of VHF/UHF repeaters and computer-to-computer packet radio, most ham operation takes place on the VHF and UHF bands.

Our FCC "driver's" license simply allows us to add information to the natural characteristics of generated

radio waves. Amateur communications ride on radio waves from 500 feet in length to under a half an inch!

Sounds travel relatively short distances. Radio frequencies, however, have all sorts of interesting distribution or "propagation" patterns. The ham operator simply takes advantage of them. Some radio waves are halted by buildings and natural terrain, some are bounced around, while others wander around in apparent unrestricted fashion, only to be captured and later returned to a receiver. The predictable characteristics of a radio wave is primarily dependent upon its frequency.

The ham bands, especially the HF, VHF and UHF allocations, represent an incredibly valuable resource to the Amateur community. They are worth billions of dollars! We tend to think of radio waves as being limitless. Nothing could be further from the truth. They are a fixed natural resource, not unlike oil and minerals. All of the known useful radio communication wave bands are all assigned to a specific radio service!

If the ham operator didn't get in on the ground floor, we wouldn't have any spectrum at all! The radio bands are now all allocated and there is a severe shortage of radio spectrum for new and existing services.

Fortunately, due to new technology the usable radio spectrum keep increasing in frequency! But it still is not enough to meet the demand. It is hard to believe that engineers once thought that any wavelength shorter than 200 meters was totally worthless for radio communication pur-

poses, but that was the thinking fifty years ago.

The only reason Amateurs have access to spectrum with shorter wavelengths is that our government originally wanted to support commercial uses of radio. Amateurs were banished to the useless world above 1500 kHz.

When I joined the ham radio ranks in the early fifties, frequencies higher than 50 MHz were considered experimental. Today, frequencies up in the billions of cycles (gigahertz range) can be effectively used to transport intelligence. It is just accomplished in more novel ways.

RADIO COMES OF AGE

You hear of antique radios and think the technology is old. But actually radio communication is relatively new! Heinrich Hertz first succeeded in transmitting and receiving radio waves in his laboratory in 1888. The word chosen to mean "cycle per second" became hertz as an honor to Heinrich Hertz. A thousand hertz (strangely, not hertzes) became a kilohertz; a million, a megahertz; and a billion, a gigahertz.

It wasn't until the 20th century (1901) that Guglielmo Marconi first spanned the Atlantic with his wire-

less telegraph. Broadcasting has only been around for a little more than half a century, television even less! Satellite communications have only been commonplace in the last twenty-five years or so! Who knows what novel mode will be next?

The allocation of radio frequencies consists of dividing the usable spectrum into segments or frequency bands. This is accomplished on a global scale since radio waves do not respect national boundaries. More than 150 national governments are members of the International Telecommunication Union. They agree among themselves on which bands should be assigned to specific uses. The ITU is a specialized agency of the United Nations.

These band assignments are influenced by the behavior of radio waves at different frequencies. For example, the HF bands can be transmitted great distances since they are reflected from the upper atmosphere. Therefore, these frequencies are allocated to long-range communications such as needed by International Broadcasting and the Amateur Service.

It is not accidental that the ham bands are all multiples of the lowest frequency Amateur allocation: 160-meter band. It was initially found that

a 160-meter signal, radiated, to a lesser extent (the second harmonic), in the 80-meter band; an 80-meter signal in the 40-meter band, and so forth. The thinking at the time was to have the Amateur bands harmonically related so that hams would not interfere with other radio services. They could only interfere with themselves!

RADIO WAVE PROPAGATION

A number of factors affect radio transmitting distance. Among these are transmitter power, radio frequency, mode of transmission, antenna type and wave propagation. Radio waves behave differently at various frequencies and they may travel diverse paths. Signals may circulate along the surface of the earth, directly through space or by reflection from the ionosphere. The ionosphere consists of electrically charged particles that form in the upper atmosphere above the earth.

The ionosphere is of great importance in the propagation of radio waves at the high frequency (3 to 30 MHz) range. The intensity of ionization varies at heights from 50 to 200 miles. Time plays a major role in the height, thickness and intensity of these layers—including the time of day, time of year and time during the eleven-year sunspot cycle. It was the Amateur Radio operator who determined the value of the medium and high-frequency short waves. Actually there was little choice since the desirable long waves were taken away and given to others.

Radio waves behave in strange ways! Some are absorbed by the ionosphere and some are refracted—often back to earth much like a stone skipping across the water. Still others pierce right through, only to be captured by an orbiting satellite and retransmitted back to earth. Disturbances on the sun can cause major temporary changes in the ionosphere which can disrupt communications.

Signal travel from transmitter to receiver may not always be the most direct. Routes that go the long way around the earth are known as "long path."

Table No. 1

Classification of Radio Waves

	Abbreviation	Frequency	Ham Band Wavelength
Very Low	VLF	3-30 kHz	None
Low	LF	30-300 kHz	None
Medium	MF	300-3000 kHz	160 meters
High	HF	3-30 MHz	80, 40, 30, 20, 17, 15, 12, 10 meters
Very High	VHF	30-300 MHz	6, 2, 1.25 meters
Ultra High	UHF	300-3000 MHz	70, 33, 23, 13 centimeters
Superhigh	SHF	3-30 GHz	9, 5, 3, 1.2 centimeters
Ext. High	EHF	30-300 GHz	6, 4, 2.5, 2, 1 millimeter

▲ Radio frequency is measured in hertz (Hz), kilohertz (kHz), megahertz (MHz) and gigahertz (GHz). The physical size of the radio wave gets smaller as its frequency increases.

Above 300 GHz, radio wavelengths are measured in centimeters (cm) and millimeters (mm). A centimeter is one-hundredth of a meter (m); a millimeter is one-thousandth of a meter.

And as if propagation considerations were not enough to deal with, the operator working long distance (DX) must also deal with noise and signal loss, extreme QRM (interference), QRN (static) and QSB (fading.) Hams have found they can frequently get through using CW (Morse code) when it is impossible on SSB (single side-band voice).

WORLD-WIDE COMMUNICATIONS

If you are going to be a serious DX'er, you have to resolve yourself to two things. One, you will have to be proficient at CW and two, you are going to have to embark on a course of upgrading your ham ticket to Amateur Extra. Advanced Class hams get substantially more HF phone frequencies.

Amateur Extras have a few more voice frequencies, but the big advantage is access to the very desirable first 25 kHz of the 80, 40, 20 and 15-meter bands. Extra Class Amateurs have nearly one third more spectrum in these four bands than the General class operator. If you have your sights set on working 300 countries, then you will need everything possible going for you.

A few more hints for chasing DX. Know your countries and their prefixes, and be prepared to do a lot of listening. Get yourself a Foreign Radio Amateur Callbook and a list of the Great Circle Antenna Bearings for your location so you will know where to aim your antenna. A very tolerant wife or husband is also a must.

Subscribe to DX Bulletins so you will know about the upcoming operations and how to exchange QSL cards. You will need them in order to collect your award, usually a certificate and your name mentioned in a ham magazine. The ARRL operates an inexpensive outgoing QSL service to DX countries, but it takes months and frequently years for turnaround of your card! Better to send your QSL direct if you need a specific country—an enclosed "green stamp" (dollar bill) will bring faster results.

IRC's (International Reply Coupons purchased at your post office) are used as money by many DXers. An IRC

pays first class postage from any foreign country, but few are used for that purpose. They are just endlessly exchanged between Amateurs. There are also Amateurs that can provide you with return postage stamps for any country.

Be thoroughly familiar with your equipment, especially how to work split frequency. Many of the rare DX countries transmit on one frequency and listen on another. Using today's HF transceivers is a breeze. All tuning is automatic! Just set your receiver on the right frequency, your antenna tuner and transmitter linear power amplifier will tune themselves.

An easy way to work foreign countries is to wait for a DX contest. With the right conditions it can be like shooting fish in a wash basin. Everyone will be trying to work as many different countries as possible. If you are lazy (like me) get a programmable CW keyer and all you will have to do is put in the foreign call sign and push a button and let the microprocessor do the rest.

You will also need a lot of patience and an even temperament to deal with the "big guns," "pile ups" and "DX police." "Big guns" are long time Amateurs who run high power and high gain directional antennas. Competing with them is tough. The "DX police" are those nitwits who patrol the ham bands without authority. A "pile up" is just that—many stations on the same frequency trying to work a rare "DX-pedition."

And then there are the "DX Spotting Nets" and the "List Takers." I have done it all and have DXCC (DX Century Club, one-hundred confirmed countries) every way imaginable, including AM phone. But I quit years ago! I don't even know how many countries I collected at that time, but it is certainly more than 200. You may get to a point where it just isn't worth the investment in time, money, effort and especially the aggravation. Ham radio is supposed to be fun—a leisure-time relaxing hobby.

When discussing long range HF communications, a word about antennas is certainly in order. The most economical way of improving an HF

transmitted signal is by using a high-gain antenna. Depending upon the number of elements, a directional Yagi antenna versus a wire dipole antenna is about equal to increasing your transmitter power four to nine times.

Assuming no transmission line loss, a three-element Yagi with an eight dB gain over a half-wave dipole effectively increases your power about five times. A 180-watt "barefoot" transmitter thus becomes a kilowatt! A 1000-watt linear amplifier can cost a few thousand dollars but a good antenna is a lot less expensive!

But, that is not the only advantage. Directional antennas null the undesirable signals off the back and sides, which enhances the strength of received signals. Quad antennas are better yet! The disadvantage is that directional antennas require a tower and rotor.

The many variables involved, and the proficiency needed to deal with them, have made hooking DX fish a very popular sport indeed. Instead of counting fish, you count countries. To be good at DXing, you almost have to commit your life and resources to it—and many hams do.

See you next month, DE, Fred, W5YI.

*Fred Maia, W5YI
National Volunteer Examiner Coordinator
P.O. Box 565101
Dallas, Texas 75356*

THE W5YI-VEC

The **W5YI-VEC** is a very large organization of Amateur Radio operators who periodically conduct ham license examinations in most large cities across the country. The W5YI Group also distributes most commercially available license study material; both for the Morse code and written tests. They may be reached at 1-800-669-9594 during regular business hours.

The W5YI-VEC is always on the lookout for Advanced and Extra Class level Amateurs who would like to assist the ham radio hobby grow by conducting periodic license examinations. Let us know if you are an Advanced or Extra Class level Amateur and wish to participate in our testing program. You may request a VE application by writing:

W5YI-VEC
P.O. Box 565101
Dallas, Texas 75356

The Water Cooled Telegraph Key

A radical new device that will appeal to all high-speed CW operators.

by Greg Seagraves, KK4AA

Iwould like to briefly give you some background on a marvelous invention. The accompanying photographs show the invention—a water cooled key. This mechanism was designed for the purpose of using a straight key for high speed CW work.

The original plans for it were drawn by Gustave Rochello shortly after the invention of the straight key in the late 1800s. Gustave spent a lot of time perfecting it and took it to several countries for exhibition, where it received numerous awards and commendations. Just as he was about to market his invention, the "Bug" came along and was more readily accepted by the Amateur population. The one drawback to his invention was its size. The base alone was 24" x 39" x 8." As a result of the popularity of the "Bug," Gustave suspended all further research and development and was never heard from again. This was most unfortunate because his invention had some truly spectacular qualities.

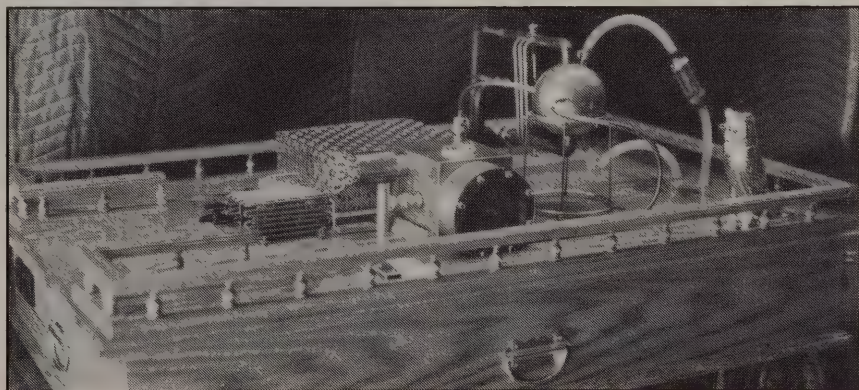
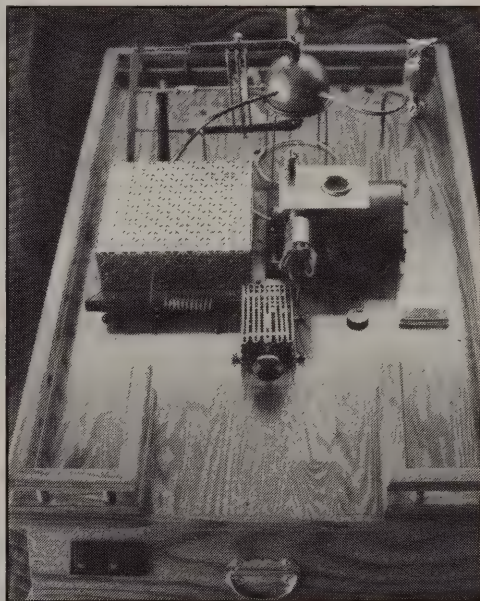
Some time ago, I happened upon a portion of Gustave's original plans and notes. After carefully studying them, I began thinking what a shame it was that his invention should have fallen into obscurity. With what little of the records that were available, I decided to take upon myself the task of recreating the water cooled key. The more I worked on it, the more I realized what a genius Gustave was.

The unit in the pictures, behind and to the right of the key, is capable of converting the water into its basic components, hydrogen and oxygen. This provides even greater cooling properties, among other things. Gustave was truly ahead of his time and who knows what other inventions he might have come up with which would have benefited mankind had he not become so discouraged over the lack of acceptance of this invention.

After many nights of "burning the midnight oil," I have painstakingly recreated an exact duplicate of his machine (or as exact as possible. As I said, portions of his notes have been lost). I am most proud of this accomplishment, not so much for my having built it, but because the man who invented it can now be given the credit he so justly deserves. If you would like additional information, I will

be glad to share with you what I can. Please don't hesitate to contact me. ☐

Greg Seagraves, KK4AA
2447 Sweet Shrub Circle
Lawrenceville, Georgia, 30244





Class Demonstrations They'll Never Forget!

by Gordon West, WB6NOA

A good instructor will have at least one live demonstration for every hour of class instruction. If you don't regularly do a "demo," your ham class is going to be boring.

The evening news regularly cuts away to recorded or live footage to hype and illustrate their broadcast. Can you imagine watching the news, and having absolutely no "on scene" footage? That would result in the same attention span as if you taught a ham radio class without the inclusion of some fun demonstrations. In the video business, they call this extended verbage "talking heads"—and there's nothing worse! So, here are some of the best demos I have found to keep the students on the edge of their seats!

Rules And Regulations—Make sure your students all have their own copy of the *FCC Part 97, Rules and Regulations*. A fun demo is to give them a rule number, and see who is the first in the room to read that rule aloud. This lets your students gain some valuable experience in working with the Part 97 rule book. By the way, you can obtain copies of Part 97 from the National Amateur Radio Association. Call them at 1-800-GOT-2-HAM to place an order.

To demonstrate emergency communications, play some short tape recordings you might have on hand of ham radio emergency transmissions. I have one of a boat sinking, and another one of a ham reporting a car wreck.



Photo by Martha Lofstrom, K1UJO



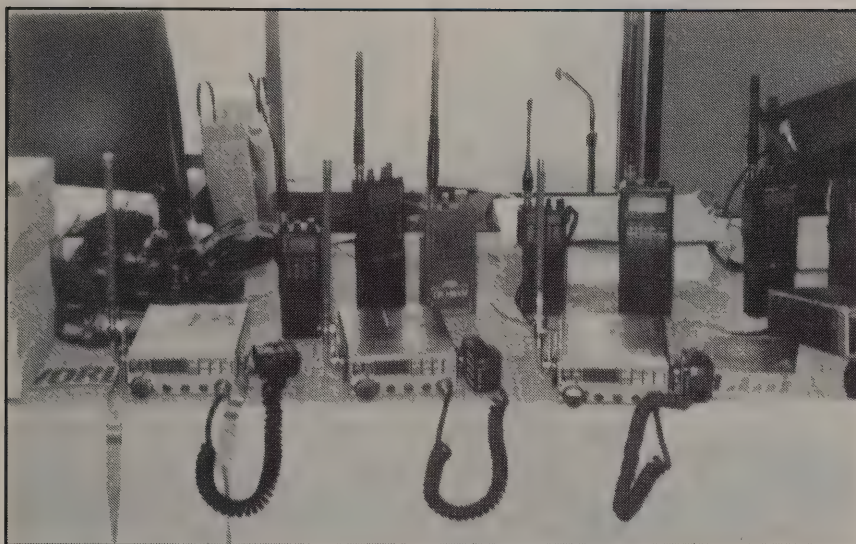
Photo by Martha Lofstrom, K1UJO

▲ Classroom demonstrations get the students involved in ham radio projects!

Pass around a copy of a valid Amateur Radio license. Let your students see the old license form and the new license forms. This gives them an idea of how close they are to obtaining their *own* Amateur Radio license.

Watch them—they'll study it for several minutes, wishing it had their name and call sign on it.

When you talk about Amateur Radio frequencies, bands, and wave length, use the (free of charge) ICOM



▲ The front tables are a good location for your equipment demos.

color HF and VHF band charts. These card-stock, all-color charts are available directly from ICOM to all registered instructors. Simply call 1-800-999-9877. You can use the back of the ICOM VHF/UHF chart to describe band plans, in detail too. Call ICOM today for these free charts.

As you begin discussing foreign countries on ham radio, use the back of the ICOM HF band chart for a list of foreign-country-call sign prefixes. You may also receive, from the Kenwood Corporation, quantities of their huge-world wall charts that clearly show every country with its own distinct call sign. For free wall maps, request them in writing from Kenwood, PO Box 22745, Long Beach, California 90801-5745.

When you talk about United States call signs, hold up a ham radio automobile license plate. This always gets attention and lets them know that they, too, will soon have call letters and possibly their own call sign license plate.

When the rules and regulations section of your textbook talks about emissions, I suggest a live receiver tuned into various incoming signals. This lets every student *hear* the sounds of CW, FSK, AMTOR, and SSB. For a laugh, I will transmit into a dummy load and listen with another SSB receiver to my recovered audio—tuning it a little high, and

then a little low. I actually talk to the students, through the dummy load and on the air, with first a high-pitched voice, and then a low-pitched voice, just to get some smiles. I sometimes use a lightbulb, and some ham sets do a nice job of modulating the lightbulb as one added visual in my presentation of rules and regulations concerning emissions.

For power output, I like to make a contact on ten meters with another station, and then cut my power down to five watts or less. This allows the student to see that maximum power is not always necessary to maintain communications.

For packet radio, I have a running packet station. They can hear the sounds of packet, and watch the recovered message on a screen. Same thing with RTTY—what they hear is what they see. And for CW, I let them listen to a computer decode CW. By tuning in a weak signal, I illustrate that the human ear and brain is always better than any computer CW decode program.

When it comes to third party traffic discussions, I hook up with a station in a foreign country that we have a third party agreement with, and let one of my students talk to that country from my classroom station. Since we have third party agreements mainly with South America, I try to find a student that speaks

Spanish, too. I then talk about the need to always ID, in English, every ten minutes.

A few classes ago, a very funny thing happened during third party traffic—I had hooked up with a station in Tokyo, and had two pretty girls in my class that were Japanese. I put them on as a third party, and they spoke in Japanese to the Tokyo operator. After a few seconds, they gave me back the mike, and started giggling and shaking their finger at me. I asked them what the Japanese ham said, and they told me, "He say you operating illegally—we have no third party agreement with his country!" The students wouldn't let me live that one down!

I then talk about autopatch calls. In fact, we call up one of the student's homes, and I let them talk over the mike, over the autopatch. I discuss in detail the prohibition of business communications over autopatch, except during emergencies.

Finally, I tune around and illustrate good operating Amateur practice, so-so operating practice, and poor operating practice. To round out the rules and regulations subelement for any level of license instruction, I let them listen in on some conversations, and draw their own conclusions on what's legal, and what's not. This includes letting them tune into portions of the 40-meter band jammers, the 14.313 and 14.275 "broadcasters," and the occasional misuse of autopatch for business on the 70-cm band. And we wind out the chapter on rules and regulations with a special visit from a representative of the FCC's Field Operations Bureau, or an Amateur operator who is with the Amateur Auxiliary and is an Official Observer. This lets the students see that ham radio operators do police themselves.

So I don't forget the best of my demos during my discussion on the first chapter concerning Commission's rules. I write down these demos right on the pages of the textbook I am teaching from. I make myself notes so I don't skip over an exciting demo. These notes also help

(Continued on page 16)

Dan & Burke



Ultrasonic sound waves play a part in fostering romance—with unexpected complications.

THE SHADOWY COOL-ness of Burke's basement lab was a welcome relief from the shimmering heat outside. As Dan came in, he saw Burke perched at the workbench, on which rested a delicate pan-balance. In one of its pans there was a one-milligram weight. With a pair of tweezers, Burke was carefully transferring some tiny objects from a fruit jar lid to the other pan.

"Looks like you're really up to big business today," Dan observed. "What are you weighing, peach fuzz?"

"Nope ... mosquito cadaver," Burke said, as his round face wreathed itself into an enigmatic smile.

Dan moved to the bench and peered down through his horn-rimmed glasses at the jar lid. Sure enough, in it were several badly mauled mosquito carcasses.

"Why are you doing that?" Dan demanded.

"We-l-l," Burke said with hesitation, "It's a rather long story—"

"Never mind the buildup," Dan interrupted. "You know you're dying to tell me, so give!"

"It all started a couple of nights ago. Looking out my bedroom window, I saw Jennifer, the girl next door, sitting on her porch swing, blubbering and crying away. I thought maybe she had locked



herself out of her house or something and I went down to see what was wrong."

"It seems that a dude by the name of Marvin Noble, who works at the video store, is her 'big squeeze.' For the life of me, I can't see why. This Marvin guy is the sort even nature hates. He's allergic to anything that grows. He breaks out in a rash if anyone even mentions onions or radishes. She swears he will start itching just from seeing the word ivy in print.

"Even so, she has her mind dead set on marrying the 'fuzzball.' That night she thought she had him ready to pop the big question. Marvin was in a rare mood—for him—with nothing to take his attention off her. He had even given her a couple of compliments about how pretty her hair looked in the moonlight.

"They sat in the porch swing, and she started rehearsing mentally just how she was going to say 'I do' to his proposal. Then, suddenly, Marvin began slapping at his face and ankles, and jumped up saying he had to leave. Apparently he's one of those people that mosquitoes just

love to attack, with bites that swell up on him to about the size of a quarter. Anyway, Marvin had to rush home quickly for some special ointment for the welts."

"That was why she was crying. She said she'd placed all her hopes on this moonlight porch swing; and now that it had failed, she just knew Marvin would never propose."

"Why doesn't she try mosquito repellent?" Dan asked.

"I thought of that, too, but she says the odor clashes with her perfume. She has invested a small sum in the stuff and is certain it plays a big part in giving old Marvin the business. I told her I'd try to see if I couldn't think of something to help her."

"How come you're so eager to play Cupid?" Dan asked suspiciously; "you going soft on this gal, too?"

"Have you got rocks in your head?" Burke demanded. "She's practically an old woman. I'll bet she's twenty-two or twenty-three if she's a day."

"It's just that I don't like having someone, bawling under my window when I'm trying to sleep," Dan replied. "And her problem appeals to my scientific curiosity."

"How about Marvin? Don't you think it's a bit unscrupulous to help trap a fellow man?"

"That bothered me a little until I happened to remember Marvin was the joker who called the FCC about a ham in his neighborhood. Ole Marv said he was sure the poor guy was interfering with his TV recep-

Dan & Burke

tion. It turns out his trouble was caused by an old-fashioned carbon filament light bulb in his basement. Some of those old bulbs act like miniature TV transmitters and cause interference to crawl up and down the picture."

"He deserves it!" Was Dan's prompt, harsh judgment; "but how are you going to help with the mosquito situation?"

"I got an idea from something I read in *Scientific American* two or three years ago. You know sound waves can exert severe stress on objects that are resonant at the frequency of the sound. Remember how some opera singers can shatter a wine glass just by holding the right high note? Well, I think I can produce an ultrasonic sound wave at a frequency that will vibrate a mosquito violently and destroy him without people being able to hear the sound."

"Yesterday I borrowed a high-powered tweeter speaker from a hi-fi nut I know and hooked it across the output of my stereo amplifier. It's a Carver, made up in Lynnwood, Washington and has frequency response clear up to 100,000 cycles. So when I ran my audio signal generator into the front end of the amplifier, I got considerable power output from the pith ball on a light thread in the path of the narrow cone of sound put out by the tweeter and then varied the frequency of the audio signal generator. At certain ultrasonic frequencies, the ball was jerked back and forth so violently by the inaudible sound waves that it looked blurred. I'm sure that if I can hit just the right frequency I can exert several G's of stress on a mosquito and shake him loose from his wings!"

"Why are you weighing the mosquitoes?"

"To get the average weight to use in the acceleration graphs and formulas for vibratory motion that I found down at the library. They're pretty hard to use, but if I do it right I should be able to figure out just the right frequency to apply maximum stress to a single mosquito."

As he talked, Burke finally got the scales to show a satisfactory balance and then he carefully counted the dead mosquitoes in the pan. Next he hit the 'Sidekick' key on his computer and brought up an on-screen calculator. While fiddling with the keys, Burke made a few calculations, and jotted down some figures on a pad.



"We-l-l-l," he finally said hesitatingly, "if I've not slipped somewhere, it looks as though a frequency of about 19,000 cycles ought to do it. Tonight I'll run that frequency into the amplifier and direct the cone of sound from the tweeter speaker right a Jennifer's porch swing from my upstairs window. She says she'll maneuver Marvin into position there promptly at 10:30 P.M. even if she has to chloroform him. I'll keep the mosquitoes away with my super-sonic gun until Jennifer and her perfume have done their deed."

"Playing electronic Cupid is something I've got to see," Dan announced. "Reserve me a seat right next to yours. I'll be there right after 'Married With Children' is over."

He was as good as his word, and the two boys squatted on the floor by the window of the hot, darkened bedroom. After almost an hour, they heard the picket gate of the house next door click open and shut, and caught sight of two figures walking onto the vine-hung front porch. Burke already had the amplifier warmed up. As he heard the rhythmic squeaking of the porch swing chains, he flipped on the oscillator

that had been preset to the ultrasonic frequency. The shift in the bar-graph display indicated that the amplifier was delivering power. No sound was heard from the speaker, however, and there was no halt in the rhythmic squeaking of the swing chains. "Well, at least Marvin can't hear the sound," Burke whispered hoarsely as he stared down at the darkened porch.

Just as he said this, there was an anguished howl from below, and a frantic ball of white erupted from beneath the porch and ran crazily about the yard.

"Cowabunga!" Dan gasped, "its Dreyfus! What's the matter with him?" Before Burke could answer, Marvin's trembling voice floated up to them: "It's a mad dog!" He shrieked. Then he burst from the shadow of the porch, and with two giant steps reached the picket fence and vaulted nimbly over it. He landed on the sidewalk running. As his staccato footsteps died away in the distance, Burke reached over and switched off the oscillator. Instantly Dreyfus' howling stopped.

"That mutt certainly fouled things up," Burke said sadly. "Dogs can hear sounds too high pitched for human beings. That high frequency note must have been pretty painful to poor Dreyfus' ears."

The two boys went downstairs and across the yard. To their astonishment, they heard the sound of almost hysterical laughter coming from the porch. Then Jennifer ran down the steps, threw her arms about them, and kissed each squirming boy soundly on the cheek.

"I'll never, never forget how funny Marvin looked as he went over that fence," she finally managed to gasp. "And I want you boys to know I'll never forget what you've done for me. I guess I felt sorry for Marvin because he seemed to have so much trouble, and I foolishly thought I was in love with him. However, I certainly couldn't marry anyone who would run off and leave me alone when he thought there was a mad dog present. I don't know how you

DAN AND BURKE

(Continued from page 15)

did it, but you guys are awesome!"

As she said this, she stooped down and picked up Dreyfus, still pawing gingerly at his ears, and gave the "mad dog" a big hug; then she went into the house, giggling happily.

"Women!" Dan said disgustedly, as he rubbed the lipstick print of his cheek vigorously with the back of his hand.

"Check," Burke agreed. "I suppose we may as well go to bed now, but I'm coming over the first thing in the morning to see if there are any wingless mosquito fuselages lying around under that swing."

Dan took a couple of steps and turned around. "Hey, Burkie," he said thoughtfully, "I wonder if you'd promise me something."

"Sure thing. What is it?"

"Well, if I should ever get so weak-minded as to think that I want a girlfriend, just let me manage my own love life, will you? Please don't try to help me!" □

ON THE COVER

(Continued from page 1)

this year, on April 24, 25, and 26 in Dayton, Ohio. Shows are a great way to find new and used equipment, meet new friends and discover new aspects of the hobby. See you there!

LETTERS

(Continued from page 4)

arrives. We hooked it up to a battery and put a Hustler whip antenna on our van at Loma Point on Thursday, and heard from Argentina, Atlanta, Alaska, Japan and Australia in about 15 minutes (10 meters). We worked Japan and Tennessee (which was also mobile) before we shut down. That band was alive!

Thanks for getting me started.
73,

Thomas B. Nast

About 10 days ago, I requested that your office send me a print-out of some tests. They arrived on the day I

took my tests. This was a bit too late to help me. However, no problem. I passed the Novice and Tech tests nicely. Although I didn't intend to, I took the 5-wpm test and passed that too! This little note is to thank you and your staff for being so responsive. The enclosure is to cover the costs of your efforts and postage, since I am aware that NARA is not-for-profit. Stoner's *Ham Radio Handbook* did the job and I am most pleased.

Respectfully,
Carrol Madison

EDUCATION REVISITED

I enjoyed reading my first copy of *The Amateur Radio Communicator*. As the owner of a very successful computer graphics and imaging business, I regularly receive letters and resumes for employment consideration. The most disgusting thing is to receive these requests from college undergraduates and post graduate students with misspelled words and sentences that do not make sense. If people cannot use the English language they should not be in college. They should still be in remedial spelling and grammar classes in high school. Lowering the standard for graduation is putting incompetent, unqualified people in jobs and college, where they do not belong.

Unfortunately, this lowering of standards is not only in education, but in law enforcement, firemen entrance exams, etc. It is totally disgusting to hear on the news that the tests for these jobs are discriminating because all the wrong people are passing them.

Lowering the standards for the underachiever is not the way to help the American people. This should soon become obvious to the "dogooders" in our society as the United States keeps falling behind the rest of the world. The help will come when our educational system raises the standards and gets rid of the teachers who, in many instances, are unqualified. We must instill a feeling of pride for achievement. This can be done but not under the present circumstances.

Everyone is trying to blame the Japanese and all other societies for taking unfair advantage of the Americans. *I do not Agree!!!* I say "Don't blame someone for doing a good job, just do yours better."

If we are to ever get America back on the right track and improve our total standard of living for everyone, we need to rid ourselves of the people that force us to lower our standards in the name of discrimination. Let's get back to common sense and discipline in our schools, raise our test standards to the highest possible levels and get teachers that are qualified. Let's not reward the underachiever or troublemaker by letting him or her "get by" and make the people who are trying feel cheated.

Sincerely,

Larry Reitz, W8CWD □

DEMONSTRATIONS

(Continued from page 13)

me prepare, ahead of class, each of my "props."

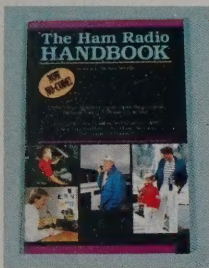
Next month, get ready for some laughs when we play the RST demos during operating procedures, bounce laser beams off of mirrors, and refract sunlight into wave length colors for the radio wave propagation section. Plenty of demos and laughs ahead!

73 from Gordon, WB6NOA □

CQ ALL SCHOOLS ON THE AIR

Every Tuesday and Thursday morning, at approximately 1800 hours UTC, Carole Perry, WB2MGP, and Gordon West, WB6NOA, go on the air with the 10-meter CQ ALL SCHOOLS net at 28.303 MHz. If you are teaching a day class, or teaching in the school systems be sure to tune in. Join Carole and Gordo for a lively classroom-to-classroom contact. Prepare to QSY up the band as soon as you make contact with another classroom on the air.

AVAILABLE FROM NARA

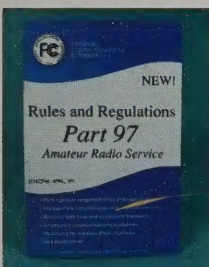


The Ham Radio Handbook

by Donald L. Stoner, W6TNS, is the leading book for anyone wishing to earn the new code-free Technician license. Includes every question you might be asked during a test session, plus the multiple-choice answers.

The Ham Radio Handbook is the only test manual that explains in detail why the correct answer is correct. Includes simple and easy-to-understand theory along with many photos and drawings. The book divides the test questions by subelement, devoting a chapter to each. The appropriate test questions and answers are given at the end of each chapter. The list of correct answers is included at the end of the book. Guaranteed to provide all the information needed to get your ham radio license.

The Ham Radio Handbook is only \$9.95 (\$2.00 S&H) #B610.

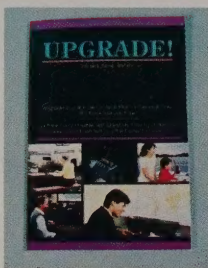


The Rules of The Road

It took the Federal Communications Commission nearly two years to completely overhaul the Amateur Radio Service Rules to reflect current technology and Amateur operations. The FCC also deleted

many unnecessary, obsolete, and redundant rule provisions.

The new rules have now been totally reorganized and revised into Part 97 of Title 47 CFR (Code of Federal Regulations) which covers all rules and regulations governing the Amateur Radio Service. Learn about the guidelines for emergency communications, required equipment standards, operator responsibilities and restrictions, and much more. Over 60 pages of information—a must for every Amateur to have in the ham shack. **Rules and Regulations, Part 97, Amateur Radio Service** is only \$4.95 (\$1.00 S&H) #B640.



UPGRADE! Shows You How Easy It Is To Upgrade!

UPGRADE!, a new book by Donald L. Stoner, W6TNS, that shows "no-code" hams how easy it is to upgrade to the Tech-

Plus or General Class license.

UPGRADE! was written to encourage learning, rather than memorization. There are nine chapters covering each subelement of the General Class exam. All multiple-choice questions and answers for the General Class exam are included. Every chapter provides you with simple-to-understand discussions explaining the theory behind each exam question.

UPGRADE! also contains a chapter describing the different Amateur Radio license classes, descriptions of the Elements (tests) which must be passed to move to a higher license class, and an extensive history of Morse code. Fred Maia, W5YI, and Gordon West, WB6NOA, provide their favorite tips on learning Morse code to help you avoid the dreaded "speed plateau" at 8 to 9 words-per-minute.

UPGRADE! is available from all major Amateur Radio equipment stores, or you can order direct from NARA for only \$9.95 (\$2.00 S&H) #B620.

Practice The Code With These Outstanding Code Tapes!

These tapes will help give you the practice you need to pass your next code test. Each set contains two cassette tapes.

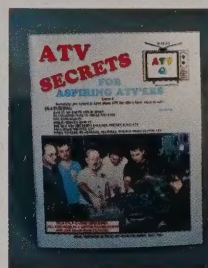
- Novice/Technician goes to 5 words-per-minute to prepare you for Element 1(A) #T710.
- General takes you from 5 to 14 words-per-minute to prepare you for Element 1(B) #T720
- Extra will take you from 12 to 24 words-per-minute to prepare you for Element 1(C) #T730.

Order your set today for only \$11.95 (\$2.00 S&H).

Back Issues of The Amateur Radio Communicator

Back issues of *The Amateur Radio Communicator* are still available.

- Volume 1, Issue 1 (in very short supply) is \$5.00 (\$1.00 S&H) #K809.
- All other issues are \$2.00 (\$1.00 S&H) #K810.



ATV Secrets For Aspiring ATV'ers

ATV Secrets For Aspiring ATV'ers, written by Henry Ruh, KB9FO, contains everything you wanted to know about Amateur Television (ATV). All ham

licensees can participate in ATV—even those with the new no-code license! Amateur TV is fun and exciting. Take your home video productions and find new audiences, make new friends and get more enjoyment from your equipment. Hams should be seen as well as heard!

ATV Secrets is available through all major Amateur Radio equipment stores, or you can order from NARA for only \$9.98 (\$2.00 S&H) #B630.

The Flight Of OSCAR One—A True Collectors Item!

The first OSCAR satellite was little more than an orbiting shoe-box. But it carried aloft far more than just a keyer and transmitter—it also held the dreams of Amateurs everywhere for a new era in communications. Today, we enjoy worldwide contacts via sophisticated OSCARs orbiting tens-of-thousands of kilometers above the earth. Relive the launch of OSCAR One from Vandenberg Air Force Base—hear the excitement of the dedicated hams who operated the OSCAR net and listen to its greeting message, "HI," as it whirled around the globe in 1961. This historic recording is only \$6.95 (\$1.50 S&H) #T700.

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- New Amateur Radio operators
- Public and private school teachers who want to introduce their students to Amateur Radio
- Amateurs who are now, or want to become, ham radio instructors
- VE's (Volunteer Examiners) who administer the Amateur Radio exams
- Amateurs concerned about the future of the Amateur Radio Service

What Will You Gain When You Join NARA and Receive the *Communicator*?

- 1 The knowledge to help you get the most from the Amateur Radio Service
- 2 You will help insure a solid future for the Amateur Radio Service and its frequencies
- 3 The knowledge that *you* will be helping others become involved in Amateur Radio.

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The Amateur Radio Communicator will include clear and informative articles on topics such as:

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- Repercussions that government regulation changes will have on the future of Amateur Radio
- The latest news on proposed changes to the Amateur Radio Service
- Getting materials for your radio classes
- Classroom demonstration techniques
- Obtaining commercial support for your classes
- Keeping your students motivated
- Publicizing your Amateur Radio class
- Up-to-date information on the VE program and much, much more

▶ **NARA publishes the only ham magazine that addresses these subjects in a simple-to-understand manner.**

What's NARA Doing?

The goals of NARA are to:

- Get more people licensed in the Amateur Service.
- Get more young people interested in Amateur Radio.
- Save the various Amateur bands (frequency ranges) from confiscation by commercial interests.
- More recognition for the Amateur Radio Service.

▶ In the past year, Amateur Radio has lost part of the 220-MHz band and, in some areas of the country, is in the process of *losing access* to another band (900 MHz).

NARA is striving to get more people involved in the Amateur Service so we can increase activity and retain our remaining Amateur bands.

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